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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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NIXON PEABODY, LLP 401 9TH STREET, NW SUITE 900 WASHINGTON, DC 20004-2128			EXAMINER HARPER, V PAUL	
			ART UNIT	PAPER NUMBER
			2654	

DATE MAILED: 08/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/896,836

Applicant(s)

LEYSIEFFER ET AL.

Examiner

V. Paul Harper

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/13/04, 7/13/0</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Information Disclosure Statement

1. The Examiner has considered the references listed in the Information Disclosure Statements dated 2/13/2004 and 7/13/2005. Copies of these Information Disclosure Statements are attached to this office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6, 7, 9, 10, 13, 14, 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels et al. (US Patent 6,047,074), hereinafter referred to as Zoels, in view of Tibbetts (European Patent Application 0 548 580 A1), hereinafter referred to as Tibbetts and further in view of Leonhard (U.S. Patent 5,884,260), hereinafter referred to as Leonhard, and Boss et al. (U.S. Patent 5,933,805), hereinafter referred to as Boss.

Regarding **claim 1**, Zoels discloses a programmable hearing aid, which includes the following features:

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- at least one acoustic sensor, located upstream of analog-digital converters, for picking up an acoustic signal and for converting it into an electrical audio signal (Fig. 1 items 2 and 4, col. 2, lines 1-6)
- an electronic signal processing unit for processing and amplifying said electrical audio signal (Fig. 1, item 7, col. 2, lines 1-6),
- an electrical power supply unit which supplies individual components of the system with current (Fig. 1, with a necessary power supply), and
- an actuator arrangement ... with at least one output actuator selected from the group consisting of electroacoustic, electromechanical, and purely electrical actuators, and any combination thereof, for stimulation of damaged hearing based on the electrical audio signal processed in the electronic signal processing unit (Fig. 1, item 5, output transducer). And as just stated, Zoels teaches the use of an electroacoustical output transducer (col. 1, lines 9-11), but Zoels does not specifically disclose "an actuator arrangement which is configured for positioning in a single external auditory passage." However, the examiner contends that this concept was well known in the art, as taught by Tibbetts

In the same field of endeavor, Tibbetts discloses a non-occludable transducer for in-the-ear applications that can be used with various hearing aids (abstract)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing the transducer, as taught by Tibbetts, because it is well known in the art at the time of

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invention for the purpose of allowing deeper insertion into the ear canal (Tibbetts, col. 3, lines 6-13) and hence better transmission of sound.

In addition, Zoels' invention includes a programmable processor, but Zoels does not specifically disclose, "wherein the signal processing unit has a speech analysis and recognition module and a speech synthesis module for facilitating the transmission of speech information in a noisy environment" "However, the examiner contends that these features were well known in the art, as taught by Leonhard.

In the same field of endeavor, Leonhard discloses a system for detecting and generating transient conditions in auditory signals. Leonhard's system performs signal analysis, recognition and synthesis (Figs. 8, 19, abstract, col. 1, lines 5-20; col. 15, lines 16-25), and Leonhard further teaches that the invention may be used to in hearing aids to improve noise suppression in speech signals (col. 15, lines 30-34).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing that algorithmic features, as taught by Leonhard, for the purpose of improving the quality of the speech signal generated (Leonhard, col. 15, lines 30-34).

Furthermore, Zoels in view of Leonhard do not specifically teach "the speech analysis and recognition module has an arrangement for detecting and extracting additional prosody of the speech information and wherein the speech synthesis module is provided with an arrangement for taking into account the prosody of speech information in speech synthesis." However, the examiner contends that this concept was well known in the art, as taught by Boss.

In the same field of endeavor, Boss discloses a system for retaining prosody during speech analysis for later playback. Boss's system includes a speech analyzer for detecting phonemes and a synthesizer for playback (abstract, Fig. 4 item 48, Fig. 5 item 98, col. 2, line 61 through col. 3, line 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, since it is well known in the art for the purpose of improving the quality of the synthesized speech for hearing impaired individuals (Quagliaro, U.S. Patent 6,408,273, col. 3, lines 10-16).

Regarding **claim 2**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the signal processing unit has a digital signal processor which contains software modules for speech analysis and synthesis." However, the examiner contends that these concepts were well known in the art, as taught by Leonhard.

Leonhard's system further performs signal analysis and synthesis within a signal processor (Figs. 8, 19, abstract, col. 1, lines 5-20, col. 15, lines 49-54), the processor necessarily containing software modules.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels by specifically providing algorithmic features, as taught by Leonhard, for the purpose adhering to standard modular software design practices.

Regarding **claim 3**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible adaptability by replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are adaptive."

Regarding **claim 4**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 2). Furthermore, Zoels indicates that the programmability of the hearing aid offers possible replacement of the program (col. 2, lines 20-25), and as Leonard teaches (see rejections of claims 1 and 2, above), the analysis, recognition, and synthesis programs are software modules (hence replaceable or re-programmable), which corresponds to "the speech analysis and speech recognition module and the speech synthesis module are re-programmable."

Regarding **claim 6**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit phonetic categories between them." However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, signal corresponding to phonemes are used (col. 11, lines 1-9, col. 13, lines 14-26, col. 15, lines 17-24, Figs. 8 and 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically using signal representing phonemes, as taught by Leonhard, since phonetic representation can be used during both recognition and synthesis.

Regarding **claim 7**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels does not specifically teach "the speech analysis and speech recognition module and the speech synthesis module are adapted to transmit lexical categories between them." However, the examiner contends that this concept was well known in the art, as taught by Leonhard.

Leonhard further discloses that during analysis, recognition and synthesis, a word/sentence determination can be made (col. 13, lines 14-26, Fig. 19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the use of lexical categories, as taught by Leonhard, since lexical categories can improve accuracy during recognition and can also be useful during synthesis.

Regarding **claim 9**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do

not specifically teach “the arrangement for detecting and extracting prosody of speech information is adapted for extraction of level and characteristic of fundamental speech frequency for voiced sounds, and wherein the arrangement for taking into account prosody of speech information in speech synthesis is adapted to effect the corresponding modulation of the output signal.” However, the examiner contends that this concept was well known in the art, as taught by Boss.

Boss further teaches that during the extraction of the prosodic features, pitch (fundamental frequency), duration and amplitude (level) are detected and that these parameters are encoded and used during synthesis (Fig. 4 items 56, 58, and 60; col. 3, lines 5-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the features, as taught by Boss, to more accurately reproduce the prosodic features of the analyzed speech.

Regarding **claim 10**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches that the signal processing (used in Zoels specifically for tinnitus treatment, and in Zoels in view of Leonhard for analysis and synthesis) can be enabled and disabled (col. 5, lines 19-44), which corresponds to “the speech analysis and recognition module and the speech synthesis module are adapted to be turned off to enable processing of audio signals without speech analysis and synthesis.”

Regarding **claim 13**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1). Furthermore, Zoels teaches that the hearing aid system can be used for tinnitus therapy (i.e., programmed for the masking of the tinnitus) (col. 1, line 64 through col. 2, line 55), which corresponds to “the signal processing unit contains software modules adapted to enable masking of tinnitus parallel to operation of the hearing aid.”

Regarding **claim 14**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an amplifier and a signal converter (necessarily including an A/D converter) before the signal processor (Fig. 1 items 6, 4), which corresponds to “the signal processing unit has a preprocessing arrangement for at least one of pre-amplification and filtering, and has an A/D converter for analog-digital (A/D) conversion of the acoustic signals.”

Regarding **claim 17**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 1); in addition, Zoels teaches the use of a signal converter (necessarily including a D/A converter) feeding an output transducer (Fig. 1, col. 2, lines 1-10), which corresponds to “at least one digital-analog converter is connected upstream of the actuator arrangement.”

Regarding **claims 19 and 20**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 17); furthermore, Zoels teaches

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the use of a digital hearing aid (with a signal converter and a signal processor) that can be employed for tinnitus masking (abstract, col. 2, lines 1-35), which corresponds to “the signal processing unit has a digital signal processor for processing A/D-converted acoustic sensor signals which have been preprocessed by means of the preprocessing arrangement and for generation of digital signals for tinnitus masking.”

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Tibbetts, Leonhard and Boss as applied to claim 1 above, and further in view of Markowitz (*Using Speech Recognition*, Prentice Hall, 1996), hereinafter referred to as Markowitz.

Regarding **claim 5**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1), but Zoels in view of Leonhard do not specifically teach “the speech analysis and speech recognition module and the speech synthesis module include a digitally implemented neural network.” However, the examiner contends that this concept was well known in the art, as taught by Markowitz.

In the same field of endeavor, Markowitz teaches the techniques for using and implementing speech recognition. In addition, Markowitz teaches the use of neural networks for speech recognition (p. 44, §2.5.1 “Neural Networks for Speech Recognition,” p. 46, §2.5.7 “Neural Networks for Speech Coding”).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing the neural network techniques for speech recognition, as taught by Markowitz, for the superior classification techniques resulting from the use of neural networks.

4. Claims 11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Tibbetts, Leonhard and Boss as applied to claim 10 above, and further in view of well known prior art (MPEP 2144.03).

Regarding **claim 11**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches an automatic change in the control elements (in this case, a change in the generated signals for tinnitus therapy) (col. 5, lines 20-44), which corresponds to “means for automatically turning off the speech analysis and recognition module and the speech synthesis module [signal processing modules] ...”. But Zoels in view of Leonhard does not teach that the switching occurs “at a low level of interfering sound.” However, the examiner takes official notice of the fact that the automatic switching of noise-reducing signal processing software was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that automatic switching could be used, making the operation of the unit more convenient for the user.

Regarding **claim 12**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 10); in addition, Zoels teaches that the signal processing can be controlled by a control element (Fig. 4 item 17, col. 5, lines 20-44), which corresponds to "means for turning off the speech analysis and recognition module and the speech synthesis module ...". But Zoels in view of Leonhard do not specifically teach that the means is "...by remote control." However, the examiner takes official notice of the fact that the use of a remote control for the purpose of controlling the operation of a hearing aid was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the control function of Zoels in view of Leonhard such that a remote control could be used, making the operation of the unit more convenient for the user.

Regarding **claim 15**, Zoels in view of Leonhard teach everything claimed, as applied above (see claim 14), including the use of a signal converter (Zoels, Fig. 1 item 14), but Zoels in view of Leonhard do not specifically teach "the preprocessing arrangement comprises an anti-aliasing filter." However, the examiner takes official notice of the fact that the use of an anti-aliasing filter before an analog to digital conversion for the purpose of reducing aliasing was well known in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard to include an anti-aliasing filter, to improve the quality of the signal processing.

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5. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoels in view of Tibbetts, Leonhard and Boss as applied to claim 1 above, and further in view of Magotra et al. (US Patent 5,608,803), hereinafter referred to as Magotra.

Regarding **claim 16**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of a microphone connected to a signal converter (Fig. 1, items 6, 4), but Zoels in view of Leonhard do not specifically teach, "a plurality of acoustic sensors are provided, each of the acoustic sensors being upstream of an analog-digital converter." However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where the outputs of two microphones are feed into A/D converters (Fig. 1, items 10, 1, col. 3, lns 35-50).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic inputs, as taught by Magotra, for the purpose of improved filtering capabilities.

Regarding **claim 18**, Zoels in view of Tibbetts, Leonhard and Boss teach everything claimed, as applied above (see claim 1). In addition, Zoels teaches the use of an output transducer connected to a signal converter (Fig. 1, items 5, 4), but Zoels in view of Leonhard do not specifically teach that "the actuator arrangement comprises a

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plurality of actuators, and wherein a respective digital-analog converter is connected upstream of each actuator.” However, the examiner contends that this concept was well known in the art, as taught by Magotra.

In the same field of endeavor, Magotra discloses a programmable digital hearing aid where stereo outputs feed earphones (Fig. 1, items 8, 11, 13; col. 3, lines 40-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Zoels in view of Leonhard by specifically providing multiple acoustic outputs, as taught by Magotra, so that stereo output can be supported.

Citation of Pertinent Art

6. The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

- Quagliaro et al. (U.S. Patent 6,408,273 B1) discloses a device for processing sounds for auditory correction for hearing impaired individuals including the analysis of the sound to extract prosodic features that are subsequently used during synthesis.

Response to Arguments

7. Applicants' arguments filed 10/02/03 have been fully considered but are either not persuasive or moot in view of new art.

8. Applicant asserts beginning on page 7:

Applicants respectfully submit that none of the Zoels, Leonhardt, Boss and Magotra references disclose or even suggest such a hearing aid system

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for facilitating the transmission speech information in a noisy environment by synthesizing speech with a speech synthesis module that also has an arrangement for taking into account the prosody of speech information in speech synthesis. (Italics added)

Leonhard teaches, *inter alia*, that “[t]he result of the processing for identification of sound may be used... [in such] systems as hearing aids,” (col. 1, lines 9-10, col. 15, lines 30-33) and that “[t]he principles of the invention may be used in hearing aids in order to improve noise suppression in speech signals.” (col. 15, lines 30-33)..

9. Applicant further asserts on page 7:

The Examiner has admitted it the rejection of item 4 on page 8 of his Action that the combination of Leonhard and Zoels does not teach the use of a speech analysis and recognition module with such an arrangement. For this purpose the Examiner has place reliance on Boss; however, as pointed out above, *Boss does not relate to the field of hearing aids, no does this patent disclose anything which would suggest applicability of its disclosure to correction of hearing impairment*. Thus, the Examiner's assertion that Boss is from the same field of endeavor is incorrect. The hearing systems of Leonhard and Zoels are not playback systems and are unrelated to such systems as are used for Internet telephony.(Italics added).

In response to applicant's argument that Boss is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the invention of Boss relates to speech systems and the representation of speech segments and prosodic parameters (col. 1, lines 16-22), which is related to the field of audio signal processing (Specification, ¶[0001]). Furthermore, as Quagliaro (“Device for the

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processing of sounds for auditory correction for hearing impaired individuals") teaches such techniques (prosody extraction, synthesis, etc.) are pertinent to the "correction of hearing impairment."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is (571) 272-7605. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

8/26/2005

V. Paul Harper
Patent Examiner
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A handwritten signature in black ink, appearing to read "V. Paul Harper", is written over the printed name and title.